

§ 103(a) Rejections**Narayanaswami et al.**

Narayanaswami et al. is directed to a system for clipping convex polygons on single instruction multiple data computers. Further, the a graphic information to be clipped is decomposed into its edges and the edges simultaneously clipped along pairs of parallel clip planes. Successive parallel operations are performed on polygons recomposed using the clipped output edges, until clipping against all clip planes has been performed. (col. 3, lns. 16-23).

Sfarti

Sfarti is directed to a system for rasterizing polygons at an arbitrary precision. The Summary Of The Invention describes a system where pixels are tested for being inside a triangle by sorting the vertices by their values in one coordinate, rounding the vertices to the nearest pixels, and calculating two characteristic functions for pixels one scan line at a time, thereby identifying two end pixels for the scan line, where the particular functions used are edge characteristic functions for the two edges which bound pixels in the scan line within the triangle defined by the rounded vertices. Because the vertices are sorted, which edges bound which scan lines are easily determined.

Chang et al.

Chang et al. is directed to a system for computer graphics boundary defined area clipping and extraneous edge deletion. The Summary Of The Invention section describes the system as a computer graphics display system wherein figures are represented by sets of polylines definitive of line segment boundary-defined areas. The method includes the steps of: determining the point at which a first line segment intersects the clipping plane; determining the point at which a second line segment intersects the clipping plane; pairing the first and second intersection points; repeating the above steps until all edges of the boundary-defined area are processed; and when a

plurality of intersection point pairs are determined, processing said point pairs to eliminate any extraneous edge formed when lines are drawn between the points comprising each of said intersection point pairs, wherein said point pair processing occurs during the area fill processing of the graphics display system when said plane comprises an X-axis or Y-axis plane.

Claims 1-2, 14-22 and 24-40

The Office Action states: "Claims 1-2, 14-22 and 24-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanaswami et al. (6,052,128) in view of Chang et al. (5,040,130), and further in view of Sfarti (5,528,737)."

Independent Claim 1

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose an initial rasterization starting point estimate. Applicants also acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose sorting the vertex data. Further, Applicants acknowledge the Office Action's statement regarding claim 22 that Narayanaswami et al. fails to disclose that the region bits define the top edge, bottom edge, right edge and left edge of a current tile being rendered.

Initial Rasterization Starting Point Estimate Not Present

Applicants submit that Chang et al. does not disclose teach or suggest Applicants' claimed subject matter, whether considered alone, or in combination with Narayanaswami et al. and Sfarti, including, inter alia, "generating coordinate data representing an *initial rasterization starting point estimate* when the region bits indicate that at least one of the sorted vertex data lies within the current tile being rendered" (claim 1). Applicants are unable to identify anywhere within the cited to language and figures of Chang et al. where the Office Action believes that, at least, Applicants' claim element "generating coordinate data representing an *initial rasterization starting point estimate*" is disclosed, taught or suggested. Instead, Applicants submit that Chang

et al. teaches the determination of multiple points where figure boarder lines intersect given clipping planes. (col. 3, lns. 13-19). Further, nowhere can Applicants identify any teaching of the using of such points as an initial rasterization staring point estimation. Further, nowhere can Applicants find in Chang et al., or any of the cited references, any discussion for any process or any need to perform graphics that is any different than how typical rasterizers perform, namely where a "typical rasterizer checks each pixel in a field to determine if the pixel is positioned within an object." (Spec. pg. 10, lns. 20-22). Further, Applicants can find no discussion of a proposed or implemented system in the cited art which operates, or is intended to operate, to "find ... [an initial] pixel that lies within the object." Applicants refer the Examiner to Applicants Specification which states that "estimat[ing] an initial rasterization staring point ... reduces the number of cycles required for rasterizer 102 to find the first pixel that requires assignment of luminance and/or color values." (Spec. pg. 10, lns. 15-18).

Providing The Initial Rasterization Staring Point Estimate Not Present

Applicants submit that Narayanaswami et al. does not disclose teach or suggest Applicants' claimed subject matter, whether considered alone, or in combination with Chang et al. and Sfarti, including, inter alia, "providing the initial rasterization staring point estimate to a rasterizer" (claim 1).

First, and as discussed above, Applicants reassert their arguments that nowhere in the cited art is "generating coordinate data representing an initial rasterization starting point estimate" disclosed, taught or suggested. Further, Applicants are unable to identify anywhere in the cited to language of Narayanaswami et al., or any of the other cited art, that discusses the function, or the need, to provide any initial coordinate point to a rasterizer, let alone providing an initial rasterization staring point estimate coordinate point. Applicants absent the teaching of

such a providing step, that the cited art cannot and does not disclose, teach or suggest Applicants' subject matter.

Applicants note that court decisions have held that in order for prior art references to be combined by obviousness, at a minimum, there must be a suggestion of desirability for the modification. *In re Fritch*, 922 F.2d 1260, 23 USPQ 2d 1780 (Fed. Cir. 1992). The CAFC has held that the motivating suggestion must be explicit. *Winner International Royalty Corp. v. Wang*, 48 USPQ 2d 1139 (D.C. Dist.Ct. 1998), *aff'd*, 98-1553 slip op. (Fed. Cir. 2000). *Sakuragi, Herbert, Mullet et al.* and *Butler et al.* do not suggest a desirability for modification, explicit or otherwise. In addition, the CAFC has held that the teaching or suggestion to make the combination and the reasonable expectation of success must be both found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488 (Fed. Cir. 1991). Further, the level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308 (Fed. Cir. 1999). Additionally, since none of the cited references teach or suggest region bits that indicate that at least one of the sorted vertex data lies within the current tile being rendered, generating coordinate data representing an initial rasterization starting point estimate when the region bits indicate that at least one of the sorted vertex data lies within the current tile being rendered, or providing the initial rasterization starting point estimate to a rasterizer, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Tiles Not Present

Further, Applicants submit that Narayanaswami et al. does not disclose teach or suggest Applicants' claimed subject matter, whether considered alone, or in combination with Chang et al. and Sfarti, including, inter alia, "... region bits indicate that at least one of the sorted vertex data lies within the *current tile* being rendered ..." (claim 1). For example, Narayanaswami et

al. discloses a single frustum, field of view or view volume, and discusses all clipping in regard to the four boundaries of such a viewing area. In other words Narayanaswami et al. only discusses a rendering area as being an entire view space or frame area. As such, Narayanaswami et al. is absent any disclosure regarding Applicants' "tile" subject matter, where such "tiles" are said to correspond, for example, both to a portion of a frame buffer, (Spec. pg. 2, lns. 6-8), and to an entire frame buffer, (Spec. pg. 10, ln. 21).

Dependent Claim 2

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose generating an orientation bit representing an orientation of a line connecting the first and second vertices of the stored primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates.

However, the Office Action continues on and attempts to equate the language of Sfarti, which discusses the description of potential geometric descriptions of objects such as a red sphere being described by a center point, radius and a color, or more complex objects being described by shape, size, orientation, surface features, and self-luminosity, with the Office Actions statement proposing the position that using orientation of sides of a triangle is required for classifying a triangle based on its shape and in order to render/raster the triangle/primitives effectively with easy manner. In contrast, Applicants respectfully submit that all that is needed to describe a triangle's shape, is its three vertices, and no additional orientation information regarding sides of a triangle is necessary. Sfarti's mention of the use of orientation as a descriptive aspect of describing a complex object, (col. 1, ln. 63), is nowhere associated with a triangle, nor is it intuitive, as a triangle is hardly a complex object nor can such information be considered as the simplest description needed to describe a triangle. Further, Applicants submit

that the absence in Sfarti, in its description of the rasterization of triangles, of any discussion of orientation of the sides of any triangle, suggests that in fact the use of such orientation information is both not needed, nor is it preferred. This lack of any mention of such orientation of triangle sides throughout Sfarti, even though the rasterizing of triangles is discussed, indicates that the earlier reference in Sfarti to "orientation" was not meant to apply to the rasterizing of triangles.

Therefore, since none of the cited references teach or suggest generating an orientation bit representing an orientation of a line connecting the first and second vertices of the stored primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

In addition, Applicants also submit that because claim 2 depends from claim 1, and as a dependent claim therefrom, claim 2 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 2 is also allowable in light of the presence of novel and non-obvious elements contained in claim 2 that are not otherwise present in claim 1.

Independent Claim 14

Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 14 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting of an initial rasterization starting point coordinate, Applicant submits that for the same reasons that Applicant indicates as support the absence of any disclosure, teaching or suggesting of an initial rasterization starting point coordinate, that the cited art also is absent any disclosure, teaching or suggesting of Applicants' "initial rasterization starting point circuit."

Therefore, since none of the cited references teach or suggest initial rasterization starting point coordinate, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Dependent Claim 15

Applicants direct the Examiner's attention to the arguments above regarding claim 1 and the Applicants' arguments that none of the cited art discloses, teaches or suggests Applicants' claimed subject matter including, inter alia, an "initial rasterization starting point estimate," nor Applicants' "providing the initial rasterization starting point estimate to a rasterizer." Based on at least these arguments, Applicants submit that Applicants' claim 15 subject matter is allowable as written. Therefore, since none of the cited references teach or suggest initial rasterization starting point estimate or providing the initial rasterization starting point estimate to a rasterizer, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

In addition, Applicants also submit that because claim 15 depends from claim 14, and as a dependent claim therefrom, claim 15 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 15 is also allowable in light of the presence of novel and non-obvious elements contained in claim 15 that are not otherwise present in claim 14.

Dependent Claim 16

Applicants direct the Examiner's attention to the arguments above regarding claim 1 and the Applicants' arguments that none of the cited art discloses, teaches or suggests Applicants' claimed subject matter including, inter alia, an "providing the initial rasterization starting point estimate to a rasterizer." As discussed therein, Applicants discussed the absence in the cited to language of Narayanaswami et al., or any of the other cited art, the function, or the need for a function, to provide any initial coordinate point to a rasterizer, whether or not such point was an

initial rasterization starting point estimate. Applicants further argue that, at least due to the fact that no function was discussed relating to the providing of an initial coordinate point, and that further no discussion was identified which further described an initial rasterization starting point estimate, that such cited art is also absent any discussion of the providing of an x-coordinate and sorted y-coordinate rasterization starting point. Again, Applicants submit that the cited art was absent any disclosure, teaching or suggestion as to any reason, or any particular functionality, which would replace typical rasterizing operations. Therefore, since none of the cited references teach or suggest providing the initial rasterization starting point estimate or providing the initial rasterization starting point estimate to a rasterizer, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

In addition, Applicants also submit that because claim 16 depends from claim 15, and as a dependent claim therefrom, claim 16 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 16 is also allowable in light of the presence of novel and non-obvious elements contained in claim 16 that are not otherwise present in claim 15.

Dependent Claim 17

Applicants direct the Examiner's attention to the arguments made immediately above regarding claim 16 and submit that for the same reasons, Applicants' claim 17's subject matter is also allowable as written.

In addition, Applicants also submit that because claim 17 depends from claim 14, and as a dependent claim therefrom, claim 17 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 17 is also allowable in light of the presence of novel and non-obvious elements contained in claim 17 that are not otherwise present in claim 14.

Dependent Claim 18

Applicants direct the Examiner's attention to the arguments made above regarding claim 16 and submit that for the same reasons, Applicants' claim 18's subject matter is also allowable as written.

In addition, Applicants also submit that because claim 18 depends from claim 17, and as a dependent claim therefrom, claim 18 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 18 is also allowable in light of the presence of novel and non-obvious elements contained in claim 18 that are not otherwise present in claim 17.

Dependent Claim 19

Applicants direct the Examiner's attention to the arguments made above regarding claim 16 and submit that for the same reasons, Applicants' claim 19's subject matter is also allowable as written.

In addition, Applicants also submit that because claim 19 depends from claim 14, and as a dependent claim therefrom, claim 19 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 19 is also allowable in light of the presence of novel and non-obvious elements contained in claim 19 that are not otherwise present in claim 14.

Dependent Claim 20

Applicants also submit that because claim 20 depends from claim 15, and as a dependent claim therefrom, claim 20 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 20 is also allowable in light of the presence of novel and non-obvious elements contained in claim 20 that are not otherwise present in claim 15.

Dependent Claim 21

Applicants also submit that because claim 21 depends from claim 20, and as a dependent claim therefrom, claim 21 is allowable for at least the reasons claim 20 is allowable. Applicants

further submit that claim 21 is also allowable in light of the presence of novel and non-obvious elements contained in claim 21 that are not otherwise present in claim 20.

Dependent Claim 22

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose that the region bits define the top edge, bottom edge, right edge and left edge of a current tile being rendered.

Further, the Office Action attempts to equate the triangle edges AB, BC and AC disclosed in Sfarti with Applicants' "top edge, bottom edge, right edge, and left edge of a current tile being rendered." Applicants submit that a tile edge is wholly different than the triangle edges identified in Sfarti, as a "frame buffer ... [is] divided into tiles of, for example, 32 x 32 pixels. [and t]riangles ... are within a give tile," (Spec. pg. 5, lns. 5-6). As such, triangles are a fixed subset of the display area which include associated triangles. Therefore, Applicants submit that because neither Narayanaswami et al., Sfarti, nor Chang et al. disclose, teach or suggest Applicants' subject matter, that Applicants' claim 22 is allowable as written. Therefore, since none of the cited references teach or suggest top edge, bottom edge, right edge, and left edge of a current tile being rendered, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Next, Applicants submit that because claim 22 depends from claim 14, and as a dependent claim therefrom, claim 22 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 22 is also allowable in light of the presence of novel and non-obvious elements contained in claim 22 that are not otherwise present in claim 14.

Dependent Claim 24

Applicants direct the Examiner's attention to the arguments made above regarding claim 16 about the lack of any teaching of an initial rasterization starting point coordinate and submit

that for the same and/or similar reasons, Applicants' claim 24's subject matter is also allowable as written. In addition, Applicants are unable to identify where in the cited language of Narayanaswami et al. that Applicants' "clamp[ing] the x-coordinate and y-coordinate of the initial rasterization starting point to the boundary intercept points," is disclosed. To the extent that the rejection is maintained, Applicants request that Examiner specifically identify where, at least, the "clamp[ing] the x-coordinate and y-coordinate" is disclosed in the cited art. Therefore, since none of the cited references teach or suggest an initial rasterization starting point coordinate, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Further, Applicants submit that because claim 24 depends from claim 17, and as a dependent claim therefrom, claim 24 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 24 is also allowable in light of the presence of novel and non-obvious elements contained in claim 24 that are not otherwise present in claim 17.

Dependent Claim 25

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose generating an orientation bit representing an orientation of a line connecting the first and second vertices with respect to a line connecting the sorted first and third vertices.

Next, Applicants direct the Examiner's attention to the arguments set forth above regarding claim 2 and for the same, and/or similar reasons, Applicants submit that claim 25 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 2 arguments directed to the lack of any disclosure, teaching or suggesting of an orientation bit, Applicant submits that for the same reasons that Applicant indicates as support the absence of any disclosure, teaching or suggesting of an orientation bit, Applicant also submits that the cited art also is absent any disclosure, teaching or suggesting of Applicants' "orientation circuit." Therefore, since none of the cited references teach or suggest generating an

orientation bit representing an orientation of a line connecting the first and second vertices with respect to a line connecting the sorted first and third vertices, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Applicants submit that because claim 25 depends from claim 14, and as a dependent claim therefrom, claim 25 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 25 is also allowable in light of the presence of novel and non-obvious elements contained in claim 25 that are not otherwise present in claim 14.

Dependent Claim 26

Applicants also submit that because claim 26 depends from claim 14, and as a dependent claim therefrom, claim 26 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 26 is also allowable in light of the presence of novel and non-obvious elements contained in claim 26 that are not otherwise present in claim 14.

Independent Claim 27

Applicants direct the Examiner's attention to the arguments made above regarding claim 1 and submit that for the same reasons, Applicants' claim 27's subject matter is also allowable as written.

Independent Claim 28

Applicants direct the Examiner's attention to the arguments made above regarding claim 1 and submit that for the same reasons, Applicants' claim 27's subject matter is also allowable as written.

Dependent Claims 29-34

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to teach that the sorting step comprises arranging the position data in descending/ascending y or x-coordinate order.

Applicants also submit that because claims 29-34 each depend, directly or indirectly, from claim 28, and as a dependent claim therefrom, claims 29-34 are allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 29-34 are also allowable in light of the presence of novel and non-obvious elements contained in claims 29-34 that are not otherwise present in claim 28.

Dependent Claims 35-38

Applicants submit that the clip code technique used in Narayanaswami et al. discards an object only when all of the out bits for all of the vertices associated therewith are tested, i.e., the "OR" or "AND" operations discussed therein (col. 1, ln. 57 – col. 2, ln. 23). Therefore, because Narayanaswami et al. requires the comparison of data associated with each vertex, Narayanaswami et al. cannot, and does not, disclose, teach or suggest Applicants' claimed subject matter including "discarding the primitive when *the* x-coordinate position is greater than *the* largest corresponding coordinate position of the current tile," (claim 35), "discarding the primitive when *the* x-coordinate position is less than *the* smallest corresponding coordinate position of the current tile," (claim 36), "discarding the primitive when *the* y-coordinate position is greater than *the* largest corresponding coordinate position of the current tile," (claim 37), and "discarding the primitive when *the* y-coordinate position is less than *the* smallest corresponding coordinate position of the current tile," (claim 38). In contrast with that disclosed, taught or suggested by Narayanaswami et al., either when considered alone or when considered in combination with Sfarti, and/or Chang et al., Applicants' novel sorting approach, along with its

other novel operational techniques, allows for the discarding of an entire primitive based on a comparison between one x-coordinate position of the primitive with one coordinate position of the current tile.

Therefore, since none of the cited references teach or suggest discarding the primitive when the x-coordinate position is greater than the largest corresponding coordinate position of the current tile, discarding the primitive when the x-coordinate position is less than the smallest corresponding coordinate position of the current tile, discarding the primitive when the y-coordinate position is greater than the largest corresponding coordinate position of the current tile, or discarding the primitive when the y-coordinate position is less than the smallest corresponding coordinate position of the current tile, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Applicants also submit that because claims 35-38 depend from claim 28, and as dependent claims therefrom, claims 35-38 is allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 35-38 are also allowable in light of the presence of novel and non-obvious elements contained in claims 35-38 that are not otherwise present in claim 28.

Dependent Claim 39

Applicants direct the Examiner's attention to the arguments made above regarding claim 1. Specifically, Applicants refer the Examiner to the arguments addressing the lack of any teaching by the cited art of the generating coordinate data representing an initial rasterization starting point estimate. As such, Applicants submit that, for the same and/or similar reasons, neither Narayanaswami et al., Sfarti, nor Chang et al. disclose, teach or suggest Applicants' subject matter including the subject matter of claim 39.

Applicants also submit that because claim 39 depends from claim 28, and as a dependent claim therefrom, claim 39 is allowable for at least the reasons claim 28 is allowable. Applicants further submit that claim 39 is also allowable in light of the presence of novel and non-obvious elements contained in claim 39 that are not otherwise present in claim 28.

Dependent Claim 40


Applicants direct the Examiner's attention to the arguments made above regarding claim 1. Specifically, Applicants refer the Examiner to the arguments addressing the lack of any teaching by the cited art of the generating coordinate data representing an initial rasterization starting point estimate. As such, Applicants submit that, for the same and/or similar reasons, neither Narayanaswami et al., Sfarti, nor Chang et al. disclose, teach or suggest Applicants' subject matter including the subject matter of claim 40.

Applicants also submit that because claim 40 depends from claim 39, and as a dependent claim therefrom, claim 40 is allowable for at least the reasons claim 39 is allowable. Applicants further submit that claim 40 is also allowable in light of the presence of novel and non-obvious elements contained in claim 40 that are not otherwise present in claim 39.

CONCLUSION

For the foregoing reasons, withdrawal of the rejections and allowance of the claims is respectfully requested. If there are any questions or comments regarding this response, the Examiner is encouraged to contact the undersigned at 312-609-7500.

Respectfully submitted,

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